The Northwestern MILLER
MILLING PRODUCTION SECTION

The Bushel and the Pound

● By Henry Nelson
Fisher Flouring Mills Co.

Henry Nelson

THE problem of ascertaining and controlling the cost of being in business has ever been a most important one; whether to be in or out of business depends on various factors, of course—such as a sustained demand for a product like yours, the quality of your product, and so on. But unless the overall costs are held down to a level where something is left over when the bills are paid, all other factors fade in importance for you are not in there to stay.

Several novel—and, I think, helpful—viewpoints and suggestions have been presented in recently published papers of the milling industry. One author, A. A. Ackels[1], points out that if even a modest gain (and I should also suggest, a modest saving) were made and retained in the business, it would equal the added sale of a very substantial quantity of product. A second author, J. W. Geddis[2], thinking in terms of modernizing processes to improve a product and, incidentally, lower its cost, cautions us not to overlook or ignore small items, since several inconspicuous improvements may well equal a major one. A third author, W. W. Bowman[3], presenting a plan for controlling costs by "work simplification," suggests detailed process analyses, which demand, among other things, answers to the following questions: Can we eliminate? Combine? Change sequence? Simplify? There can be little doubt that an affirmative answer to one or more of these questions could on occasion point the way to considerable savings in costs.

Impelled by the logic of such earnest and pertinent pleas, one may be forgiven for placing under scrutiny plainly customary and time-honored practices and procedures, even such as concern the industry as a whole. One may for a brief moment be imbued with sufficient courage and abandon to review in part the nature and application of our industry's currently used weights and measures, taking comfort in the thought that if nothing is found or accomplished, nothing is lost; but also, on the other hand, that the advantage of any even slight potential improvement would be multiplied immeasurably due to the immensity of the field influenced by it.

It is not my intention now to exalt the admirable features of the metric system, the uniform international decimal system of weights and measures which is used generally in a very large part of our civilized world. It has been legal in the U.S. since 1866 and it has found application in this country in scientific and laboratory work; but despite its merits, I do not think there is a chance of its coming into general use in the U.S. for a long time to come, although our own Bureau of Standards has manifested its belief in both its excellence and permanence by defining our own basic units in terms of metric units, establishing the pound as 0.4536 kilogram and the yard as 0.9144 meter (stated here in four decimals only); and it is the prototypes of the kilogram and of the meter, and not of the pound and of the yard, which are preserved in the vaults of the Bureau of Standards in Washington.

Simplifying Work

Our purpose for the time being is much less ambitious—namely, a survey to ascertain whether, using the U.S. customary measures now at our disposal, we shall be able to simplify our work in the grain industries, concentrating our attention for now on our old favorites, the bushel and the pound, and the manner in which they serve us.

The purpose of the bushel and the other volumetric units is to ascertain a measure of the mass of whatever material they are made to contain. The mass of a body is defined as the quantity of matter in the body and it remains constant everywhere and under all conditions; whereas weight of a body, being a force equal to the product of the mass of the body by acceleration of gravity, varies with the locality in which it is measured. The pound, however, besides being a measure of weight, also becomes a measure of mass, because of its specified relationship to the international prototype kilogram, which was determined for one place only—namely, Paris, France, and for 0°C. temperature and normal atmospheric pressure.

The pound, defined above, is our basic unit of weight; but in the milling industry, where large quantities and capacities are the rule, a larger and more convenient unit of weight is the hundredweight (cwt.), which is divisible into 100 separate pounds, just as one dollar is divisible into 100 separate cents. Referring to flour output, one cwt. is called "one unit" of production and also "one sack," assuming that a 100-lb. sack is standard.

Volumetric Unit

A bushel is a basic volumetric measuring unit designed for measuring dry substances. Most countries have had bushels with names varying according to language and of many different volumetric contents. Many substances, such as grains, fruits, herring, coal, lime, salt and sand have thus been measured in bushels by the peoples of those lands through the generations, and old folktales even tell of trades paid with bushels of gold, silver and copper coin. I do not take this to mean that at one time said coin was more abundant than now, but only that measuring by volume was extremely popular, probably because other means, such as measuring by weight on accurate scales, were slow to develop. By and by many countries abandoned their bushels in favor of metric units.

In this country volumetric measures, both liquid and dry, are defined in cubic inches. A relation between the inch and the millimeter (1/1000 meter) has been adopted for industrial purposes by the American Standards Assn. and similar organizations in other countries—namely, 1 in. = 25.4 millimeters. The space contained by a bushel measure in the U.S. is 2,150.42 cu. in.; it is the exact equivalent of the historic Winchester bushel, which has not been used in England in our day.

The standard bushel measure prepared by the U.S. government and distributed to the states holds 77.6274 lb. of distilled water at 39.2° F., or 35.2883 liters. Our standard bushel is not the equivalent of the imperial bushel, which is greater by about 3.1% and contains 2,218.192 U.S. cu. in. For measuring of smaller quantities our 2,150.42 cu. in. standard bushel is subdivided as follows: 1 bushel equals 4 pecks, 1 peck equals 8 quarts and 1 quart equals 2 pints. It follows that the dry quart measure which we use for determining test weights of wheat and other grains is 1/32 of a bushel or 67.2 cu. in.

The definitions of weight and measuring units given above serve as examples to illustrate the painstaking care which has been and still is being exerted by our Bureau of Standards to develop and maintain absolutely exact standards, against which indirectly all weights and measures, including your own, have been and will be checked.

Difficulties

Many difficulties attended the old practice of buying and selling agricultural products by volume, not so much due to the measuring unit, which was well defined, but mostly to extreme variations in the traded products themselves. Most states decreed that a bushel of potatoes, apples, onions and other bulky commodities be a "heaped measure"; and that a bushel of grains, beans and other small commodities be a "struck measure"; but points of variance persisted—such as the size of the heap, the effects of shaking, expansion or moisture, the difficulty of detecting error or fraud, and a general uncertainty of estimates of quantities based upon volume existed.

This uncertainty and the dissatisfaction which came with it quite naturally led to the much more popular practice of defining the bushels as definite weights for the different commodities; there was, however, and still is a conspicuous lack of uniformity between the states in the number of pounds of product required to make a bushel of the many commodities involved. Legislation passed by some states require that all dry commodities be sold by weight, while others require that those for which a legal weight has been established be so sold.

In most cases the state laws do not define bushels as units of meas-

(Continued on page 15a)

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Spring House Cleaning and Bucket Elevators

By **Tom A. Adler**

Engineer, Mill Mutual Fire Prevention Bureau

Spring is here, and that means house cleaning time. A custom established long ago by the housewife, and accepted by business and industry as well, is that "spring time is house cleaning time." We hear our wives making plans for rearranging furniture, replacing this and that worn rug or chair. They are planning and budgeting their time and funds to best fit the occasion. To most housewives, this house cleaning time is an important cycle, and their reorganizing and rearranging, as well as their thorough cleaning, promote safety, ease of operating their homes and a comforting feeling.

How much more important are all of these factors to the business and industrial house. It is not too early now to survey the house with an eye to providing cleaner, safer, more economical and more profitable operation. All factors and every machine and every operation must be safe and free of loss hazard to merit a place in a profitable business, regardless of type, size, number of employees, location or kind of endeavor.

To fulfill one of these obligations to at least some degree, protection from catastrophe is purchased in several forms of insurance. Most generally, the amount paid by business for this protection has a direct relationship to the measured hazard. In extreme instances, the measured hazard may be so great as to demand costly premium payments. It may be so great as to be unacceptable as a risk to any insurance company. Also, the insurance company must be conscious of sound and economical business operation if it is to be profitable and continuing.

Insurance risks demanding high rates or rates containing penalty charges for unsafe handling, unsafe machines and equipment, disregard for safe practice rules, or for unwarranted carelessness, are neither attractive to nor profitable in good, sound insurance operation. It is neither economical nor sound business practice to continue payment for unduly hazardous conditions which can easily and at little expense be corrected. This I believe, holds true whether we are considering fire, casualty, windstorm, life, sickness or accident insurance.

Since this discussion deals primarily with certain hazards pertaining to fire insurance, and more especially, with fire hazards in a specialized class, let us devote time to a study of these items and simple, inexpensive correction.

Bucket Elevator

Perhaps the one most important and most hazardous machine in any grain storage or grain milling plant today is the bucket elevator. Pneumatic conveying of grain, grain feeds and other grain products is advancing, but in grain industry plants throughout the country, the bucket elevator remains the principal machine for loading and unloading country and terminal storage elevators, and for elevating and distributing feeds, flours and other grain products.

Through the many years of their use, only minor engineering changes have been made in their design. Through almost as many years, insurance records and records of the industry point a finger at this piece of equipment as a common cause of fire. During the past few years the frequency of fires caused by bucket elevators has been on the increase. Known fires from this cause in our records alone have increased from 15 in 1949 to 34 in 1952. Forty-two fires from bucket elevators were recorded in 1953. This is partially due to the number of elevators in use today as compared to only a few years ago. During the rapid growth and expansion of the grain and grain products industry, many new plants have been built, and hardly any modification or enlarging of plants was made without the addition of one or more bucket elevators. Demands on this piece of equipment have also mounted.

In years past, bucket elevators as well as most other machines were driven from a lineshaft powered by a central power plant. Before the advent of electric power in rural areas, steam engines, internal combustion engines, and even water power served as the power source. Sleeve and even wooden bearings were commonplace. The bucket elevator in today's plant is more severely loaded and must keep pace with other machines with respect to time and capacity.

Closer spacing of new design cups was the first major change. Following this were speeding up of the drive shaft and head pulley, providing antifriction bearings on high speed shafts, conversion from multiple drives from a lineshaft to independent drives powered by electric motors. Each one of these changes presented their problems to the operator and to others as well. Machinery manufacturers were compelled to design drives which would handle the load. Power transmission and bearings to match the demands of the bucket elevator carried their share of changes and modifications. With each new demand of the bucket elevator and with each change in equipment or drives for it, new problems also confronted the insurance underwriter. His was the task of measuring the conditions of hazard and applying this measurement to his fire insurance rate.

Fire Hazard

Looking at any bucket elevator from the work floor of a grain elevator, or from any of the floors in a milling plant, one would be reluctant in accepting an opinion that this piece of equipment is a serious fire hazard and the cause of altogether too many fires. The statement is true, however, and there are records and statistics to prove it.

The task of modifying this equipment for safer operation and less serious fire hazard is neither impossible nor difficult. First to be recognized is the fact that no bucket elevator can be inspected for safety or efficiency from any other place than its heart. The heart of any bucket elevator is at its head. Here is where trouble will start, and here is where fire will originate if there is trouble. Access to the elevator head, frequent and thorough inspection, and frequent and adequate maintenance are fundamental to safe operation. Access and inspection doors in the head casing are necessary. A head pulley enclosed in a casing without inspection doors large enough and positioned so that belt and shaft setscrews can be adjusted or tightened is almost sure to cause trouble because of lack of maintenance.

The head drive mechanism is important. Designed to deliver adequate power under normal operations, and safe, efficient power under adverse or abnormal operations is one demanding factor. If of a gear type whose gears are housed in an oil bath, proper lubrication is important. Dry gears not only result in excessive wear, but will overheat rapidly and cause ignition of grain dust on the outside of metal gear housing. V-belts on a

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head drive require exacting design and engineering. Next to belts slipping on head pulleys, slipping V-belts on driving sheaves are the greatest known fire causes in this area. Enclosed gearhead motors, directly connected to the drive shaft, or driving a roller or silent chain on sprockets is an excellent and safe drive for bucket elevators. Recent developments in gear reduction assemblies are far superior to former models. Recently introduced timing belt drives offer interesting possibilities.

Good anti-friction bearings are the answer to the bearing hazard. Lubrication should follow the directions of the manufacturer. Care must be taken, however, to make certain that bearings are installed in proper alignment and remain in proper alignment. Lubrication must be adequate, but care must be taken not to overlubricate anti-friction bearings. Overlubrication or lubrication under high pressure may break the oil seal and may be a source of rapid temperature rise.

Also important is a head pulley properly aligned in the head housing, securely fastened to the drive shaft, and where an elevator is individually driven, the pulley is equipped with an acceptable lagging material. Head pulley lagging corrects a fault known to exist in many older bucket elevators. The need for head pulley lagging is becoming more evident. The increased coefficient of friction and the positive belt traction resulting from lagged pulleys prevent slipping of the belt and prevent loss of elevating capacity. Lagging does much more than that. The coefficient of friction between a clean dry cast iron pulley and a canvas, rubber or leather belt ranges approximately from .20 to .63 in the order named. With good lagging material applied to the pulley surface, this coefficient will be increased from 50% to 125%. The possibility of belt slipping because of overload or positive choke is substantially reduced.

Several recognized and well known mill machinery manufacturers and suppliers are now applying lagging to head pulleys sold to the grain industry. They have recognized that this lagging not only prevents loss of elevating capacity in their equipment, but at the same time provides increased safety.

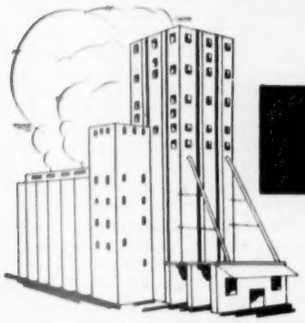
Because the demand for pulley lagging is increasing, new and excellent materials for this purpose are appearing on the market. Some have a self adhesive backing which makes it simple and easy to apply to a clean pulley surface without removing either the belt or the pulley. Cured Neoprene sheeting using a separate adhesive or bonding agent is being marketed for this purpose. This can also be applied without removing the pulley surface without removing material. This Neoprene sheeting is available in several thicknesses, and besides being an execellent lagging material, it is also valuable as a liner for grain discharge spouts, hoppers or boxes. Because of its resiliency and resistance to wear, it reduces breaking and splitting of grain and beans. Woven fabric containing asbestos fiber is on the market and is being used by several pulley manufacturers.

Special Consideration

Because of the nature of material handled and because of the more than ordinary amount of bulky, highly combustible leaves, stems or shucks in a bucket elevator handling ear or shelled corn, cobs, husks or soybeans, these bucket elevators demand special consideration.

An accumulation of such material inside the housing of an elevator head is almost certain to result in fire and possible destruction of the entire plant. In most instances, such waste material as shucks, leaves and stems will accumulate in the head, will build up on strut boards and around head pulleys. Positive means must be provided to remove this material before it becomes ignited by friction heat.

Several simple, inexpensive means have been devised to accomplish this. The important thing is to remove the accumulation before it causes trouble. Automatic release of the strut board immediately when such accumulations apply pressure from within is perhaps the most desirable. Minor modification of strut board to permit manual release at frequent intervals can also accomplish safer operation. Some operators have even removed the strut board on corn legs,



Second in a series of three

A SURVEY OF GRAIN FUMIGANTS

PRACTICAL EVALUATION

The practical evaluation of commercial grain fumigants to date has centered neither in chemical nor industrial laboratories—nor yet among scientists, entomologists, research men nor fumigant manufacturers—but rather in the grain elevator itself. In the long run no fumigant has been successful unless it could secure acceptance among the men who have had to use it.

Thus, the successful adaptation of chemicals to practical grain fumigation has so far owed less to science than to the industrial availability of a few suitable compounds and to the determination of their fitness under actual grain handling and storage conditions.

During the past 25 years the grain and milling trade have relied on a surprisingly small group of chemical compounds—singly or in admixture—as grain fumigants. Despite the testing of dozens of other compounds during this period, and the serious introduction of a few, there have been to date no really noteworthy additions to those few compounds which comprised the basic formulations in use over two decades ago.

This lack of genuine scientific development of practical grain fumigants is rather surprising—especially when compared with the fairly regular adaptation of new discoveries in most other fields. But in grain fumigation most investigators who have advocated some new compound or mixture have usually concentrated on its supposed effectiveness and have commonly ignored other basic and equally important requisites.

Interruptions to Progress

That's why the advent of a new grain fumigant or control method has so often served as an actual interruption to progress by arousing unwarranted interest and misleading prospective users. Yet most new products are offered for sale with very little knowledge of the inherent difficulties to be overcome. It's therefore not surprising that many new formulations or methods either eventually fall by the wayside or, having passed the fad stage, retain at most a limited acceptance.

The objection to this oft-repeated pattern does not, of course, lie in the worthwhile aim of seeking a better product or control method. The harm lies in basing claims on experiments which ignore practical phases of grain handling, storage, grading and processing, and thus diverting attention from the real problems.

The inference is thereby created that really effective insect control must await the discovery of a more toxic chemical or destructive force. Yet some of the most toxic compounds known to science—and even high frenquency electronic waves—have already been tried in grain insect control. Virtually all such controls have been found sadly wanting because they have introduced serious new problems for each one solved. Hence, the record to date does not indicate a solution in the direction of deadlier chemicals or revolutionary devices.

The truth is that effective and economical insect control in bulk grain is already here—and without miracles. It depends on:

1. *Correction or prompt control of high grain moisture and temperature, especially when accompanied by poor grain condition.*
2. *Study of and allowance for any grain handling or structural features calculated to handicap or prevent safe and efficient fumigant application.*
3. *Careful selection and instruction of treating personnel, followed by close supervision or actual help in application.*
4. *Use of a safe, effective and proven fumigant.*
5. *Treating "in time"—either preventively or while infestations are light.*
6. *Adequate dosage and proper application.*
7. *Adequate exposure period, followed by checks on results.*
8. *Reduction, by transferring, of any remaining excessive summer temperatures.*

In short, a good grain fumigant is only one element in an insect control program. And fumigation, when needed, is only one phase in the successful storage of grain.

Problems in Selection

Selection of a *"safe, effective and proven fumigant"* is, in reality, quite complicated by conflicting claims. And prospective buyers often lack the means to immediately sift such claims. Or a buyer may be preoccupied with price-per-gallon to the exclusion of other considerations. Yet considerable treating experience and time are needed to establish such factors as possible effects on grain, actual relative effectiveness, freedom from reinfestation and, therefore, *true unit cost for effective results.*

It is true that the great majority of commercial grain fumigants represent variations of a few basic or "standard" formulations. On that account many buyers have been led to the *erroneous* conclusion that all liquid fumigants are about equally effective, gallon-for-gallon, and that price-per-gallon can therefore well determine the choice.

Although *actually identical* mixtures under various trade names will give similar results under similar conditions, there are marked differences in both immediate and long-term results between the different *basic types* of commercial grain fumigants. And adverse treating conditions greatly emphasize such differences.

While federal and state label registration laws have supposedly resulted in close standardization of formulas, they do not prohibit occasional changes in these "standard" formulas to correspond with typical ready acceptance by manufacturers of new fads in formulation. As a result some fumigant distributors offer several "standard" grain fumigants to the trade and divide sales emphasis between them. It is therefore no wonder that buyers are confused and that a proper comparison must be checked to the elevator.

Consequently, over the years the only dependable and informed evaluation of the comparative merits of commercial grain fumigants—as actually formulated—has taken place in grain elevators or storage units. Such evaluation has not depended on technical knowledge of chemicals, but rather on experience in practical use and on the degree of reliability behind various trade names.

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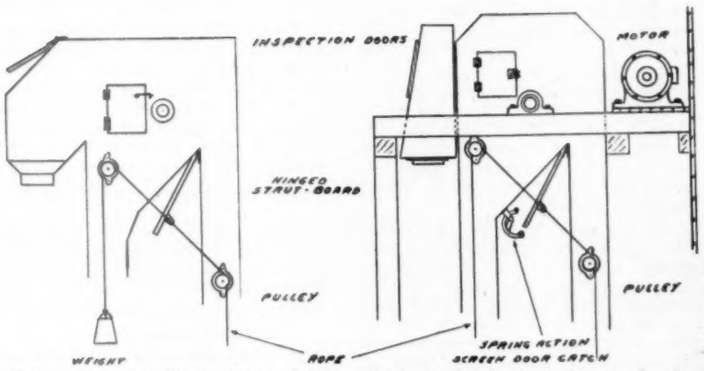
Careless Torch Use May Cause Fires

CHICAGO—The Mill Mutual Fire Prevention Bureau has warned of the danger of mill and elevator fires resulting from the careless use of welding or cutting torches.

The use of welding and cutting torches is becoming quite common in many mills and elevators, sometimes being used by employees and sometimes by an outside contractor. In any event, the bureau says, fires are apparently quite usual unless the operator is well acquainted with rules of proper procedure.

To help prevent the fires, the Mill Mutual Fire Prevention Bureau has prepared a simple set of rules to cover the use of welding and cutting torches. The rules may be obtained by writing to the bureau, 400 W. Madison St., Chicago 6, Ill.



Shown here are illustrations of design features for bucket elevator heads. These features have particular application in elevators handling corn, soybeans or grains containing leaves or shucks.

allowing the material to fall to the floor.

Because of its importance as equipment in grain plants and because of its importance with respect to fire cause, the bucket elevator and spring house cleaning have been discussed as having direct relationship. Other equipment and machines may need careful study, thorough check of drives, machinery care and fault correction as well. The important thing is to combine thorough spring house cleaning with a and equipment. Repeat the house cleaning and maintenance at frequent intervals and exercise care combined with frequent inspection. Such a program, supervised intelligently, will assure cleaner, safer, more efficient operation and guarantee profits instead of loss.

The Mill Mutual Fire Prevention Bureau has printed booklets and bulletins intended to aid in dust control, safe elevator legs, power transmission and drives, and many other informative publications. They are available without cost to anyone in the grain industry or allied trades.

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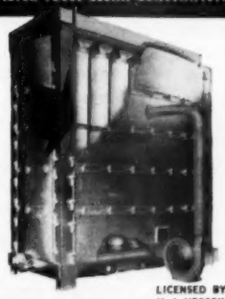

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Developments in Grain Drying and Storage

The developments described previously are among the more important developments which have occurred in the design of grain drying machines during the past ten years. If the demand for driers continues, it is reasonable to expect that developments will continue. Several of the foregoing will probably be carried to a more advanced condition, the biggest room for such improvement being probably in thermal economy and small size, partly by better development of counter-flow arrangements.

I shall refer to a few possible developments for the future. Some of these may perhaps prove to be impracticable but others may contribute to the improvement of drying technique in the next few years.

Separation of Wet Grain from Dry

It was shown several years ago that if an instantaneous measure of moisture content can be obtained, it is possible to arrange for this to operate a dividing valve in a grain stream so as to separate all grain above or below a particular level of moisture content. Since the moisture content of freshly harvested grain usually varies widely from the different parts of the same field, such an automatic separation could remove from the grain a portion which needs no drying.

Drying could thus be confined to the smaller residue so that not only would a smaller bulk need to be dried but also, the mean level of moisture being higher, it would give up its moisture more easily than if the whole bulk had been allowed to equilibrate to a mean level of moisture which was still above the safe level. A machine of this type might be too expensive to fit to a farm grain drier but it could be very useful at a large drying plant.

Intermittent Drying

Twenty years ago, Edholm, a Swedish engineer, showed that the rate of loss of water from a cereal grain falls rapidly in the first few minutes of drying until it is limited entirely by the rate of movement of water within the grain. If the grain is allowed to rest for an hour or so, redistribution of water occurs and the original high rate of water loss is restored when drying is resumed. Edholm devised a drier to exploit this fact; in the passage through this machine grain was subjected to a series of short, rapid drying periods alternating with much longer rest periods. This drier, however, did not prove very popular.

Application of the Edholm principle remains a possibility which could give remarkable economy in heat and plant. The most hopeful prospect for a development on this line appears to be an arrangement in which grain "rests" in a large container and is passed repeatedly through a very small drier, perhaps of the pneumatic type, which would extract moisture very rapidly for a period of a minute or so.

Drying by Admixture

If damp grain is mixed intimately with an absorbent material, moisture will be transferred, in the vapour phase, without the application of any heat. This is an ideal method of drying, given three characteristics of the absorbent material, viz:

(1) It must be cheap enough to be thrown away after use, or capable of easy regeneration.
(2) Its size must be such that it can be separated from the grain by an exceedingly simple process, such as sieving, and must be strong enough to retain its shape in spite of repeated handling.
(3) It must hold its absorbed moisture without becoming wet on the surface.

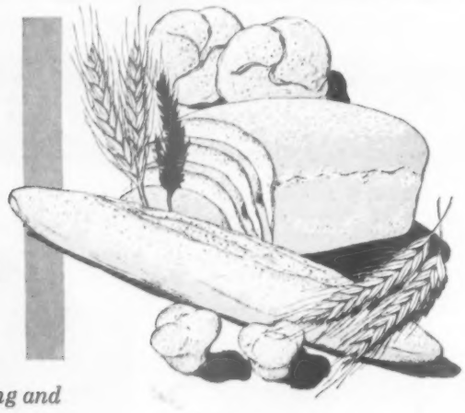
Failure to develop a successful form of this process up to the present time, in spite of several proposals and patented methods, is due simply to lack of a suitable desiccant material. Perhaps the most hopeful possibilities for the future are the production of artificial activated silica (or other) gel in the form of beads or development of wood chips impregnated with a suitable deliquescent salt as suggested by Dexter.

Use of an Artificially Raised Temperature and Humidity in a Slow Drying System

In slow drying of grain (i.e. in-bin drying) the grain comes to equilibrium with the entering air. As over-drying must be avoided, this means that the relative humidity of the entering air must not be allowed

EDITOR'S NOTE: The accompanying article is the second of two articles presenting some past and possible future developments in grain drying. The first article appeared last month. This material is from a paper by T. A. Oxley. It is reprinted from Milling, the British milling journal.

FLOUR FOR MAN'S BREAD*



A Brief History of Milling and Baking by SCIENCE WRITER

CHAPTER I. *Cereal Grains and the Start of Civilization*

MAN, THE HUNTER

Grain cultivation is an achievement of man which profoundly affected his way of life and directly started him on the road to civilization. Before he learned to live on grains, he subsisted by feeding on animals and, occasionally, on seeds. He was primarily a hunter. His home was a cave. But, because even a few hunters can soon destroy the available game, he was nomadic.

A CRUCIAL TURNING POINT

There came a time when man decided not to migrate in search of new hunting grounds when his game supply became scarce. Instead, he decided to make a stand where he was and get a living from that place. This was a crucial turning point in man's long history. The change did not happen instantly and not everyone abandoned the nomadic life. But happen it did—and it was successful!

Man learned to live on a new diet—the grains, and in the process he made a new way of life.

ROLE OF THE GRAINS

Because dry cereal grains do not spoil in storage but keep their nutritive value and flavor, man learned to depend on them as the mainstay of his diet. When supplies of other foods failed, the grains satisfied his hunger and supported his life. New habits, new arts, even a new society, were formed around his need for steady supplies of grain food.

MILLING BEGINS

Gradually man learned to separate the unwanted parts of the grain from the meal. Essentially, that is a definition of milling, even today. In learning how to do this better and more efficiently, in learning how to increase his supplies of grain, man insured his survival. He learned how to live a different life, too. Instead of grinding grain with his teeth, he learned to grind it with stones. Instead of eating the meal raw, he found that it had a better taste when moistened, and even better than that when the wet meal was heated and later, baked.

Since the start of Paleolithic times, more than 200,000 years ago, grain cultivation, milling, and bread making have been bound up inextricably with man's living. In fact, they have been the basis of his life.

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This article is one of a series which is being published in professional nutrition and dietetic journals and which will be widely reprinted for educational purposes. Reprints of this and succeeding chapters may be obtained without charge by writing the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec. Roche is proud that its vitamins are used to enrich white flour and white bread for the better nutrition of Americans and Canadians.

*This is the title of a definitive history of milling by John Storck and Walter Dorwin Teague, published by the University of Minnesota Press at Minneapolis and copyrighted by the University of Minnesota. It is used with permission as a source of material for this series of advertisements.

The next chapter titled: "The Beginning of Grain Cultivation and Grinding" will be published soon.

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to be too low. It follows that the amount of heat which may be given to the entering air is strictly limited and hence that the temperature at which the process operates cannot be far above prevailing atmospheric temperatures. It would considerably increase the amount of grain which can be dried by a given plant if the process could be carried out at higher temperatures; it is suggested that this could be effected by heating and humidifying the ambient air before it enters the plant.

Two possible extensions of this proposal are:

(1) Completely automatic control of the process by two thermostats (one before and one after the saturation chamber), the temperatures being always well above ambient.
(2) Use of exhaust air from one batch of grain for entry, after further heating, to the next. A series of bins could be arranged thus, in the same order of succession as the direction of air flow.

Use of Heat Pumps for Conditioning Air for Drying

Grain drying is a process in which air passes through a small temperature range; it is thus very suitable for application of the heat pump principle. It is difficult to believe that the thermal economies of this principle will not be worth exploitation, at least in large drying plants, in the near future.

Storage Methods Designed to Reduce or Obviate the Need for Drying

The problem of storage of damp grain is largely the problem of keeping metabolism (of grain and attendant micro-organisms) at the lowest possible rate. It appears that in the commercially important range of moisture content (perhaps between 15% and 21%) this is largely a matter of controlling micro-organisms, especially fungi, which are always present and play a very important part in the heating and spoilage of damp grain.

Three approaches to this problem have been suggested:

(a) Chemical treatment.
(b) Air-tight storage.
(c) Cool storage.

Chemical Treatment for Damp Grain

Very many proposals have been made for chemical treatment of damp grain in order to preserve it but none has yet passed the laboratory scale with any success. Milner and other workers at Minnesota have experimented with a wide range of fungistatic powders and have demonstrated excellent control of heating in damp grain, but the substances used have all been objectionable and have been required in large quantities. Some workers have claimed success with the use of various alkaline metal carbonates, not as desiccants, for which the quantities required would be too great, but as alkalis, raising the pH of the grain surface to a level of alkalinity which inhibits fungi, and at the same time producing carbon dioxide to displace air.

Proposals have been made from time to time to use a gas, or easily vaporized liquid, to act as a fumigant against micro-organisms on grain. Here again the proposals have always failed because of the lack of a suitable substance which would not be objectionable from other points of view.

It appears that chemical treatment of some kind would be an immediate success if a suitable substance could be found. Unfortunately the discovery of a suitable material probably requires an immense series of sorting tests, of the type quite commonly carried out by large teams of workers when the objective is considered to be of more immediate urgency than the preservation of grain.

This process has had some publicity recently in this country, but its main development has been in France. Even in France, however, there are at present only a few installations in which truly air-tight storage is practiced.

The principle on which this process is based is the inhibition of aerobic organism (which include the majority of fungi) by the depletion of oxygen and production of carbon dioxide in the inter-granular atmosphere. Under these conditions it may be expected that anaerobic organisms would continue to thrive, but even these would probably be restricted in activity by the accumulation of high concentrations of carbon dioxide.

It has been shown by Blanc in France that air-tight storage is certainly very effective in preserving the condition of wheat at 16.3% moisture content, even for a period of 19 months. Recently a party from England visited France and collected samples of wheat which had been stored in air-tight silos throughout autumn, winter and spring. Samples with a moisture content of 18.9% were in adequate condition for milling but in the absence of control samples it was not possible to say whether the grain had deteriorated in store or not. Experiments on a semi-commercial scale are now in progress at

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the writer's laboratory; they are designed to explore the upper limit of moisture content at which the method can be used.

All grain stored in air-tight bins develops an alcoholic smell which, however, is largely dissipated by subsequent ventilation or drying. It also loses its viability, which indicates that the process is not suitable for storage of damp seed or malting barley. It is probably quite suitable, however, for storage of reasonably dry grain for seed.

Cool Storage of Damp Grain

It has long been known that low temperatures act similarly to low moisture contents in reducing metabolic activities and rates of chemical change in grain. It is therefore not surprising that cold or cool storage of grain has been seriously proposed as an alternative to drying. It has been suggested that the low thermal conductivity of grain is itself an advantage for this technique because large bulks would act as their own thermal insulators. It is not possible to take advantage of this characteristic, however, because if the grain itself is relied upon to retain the necessary low temperature, only the inner parts of the bulk would be effectively in cold storage; all the outer layers would fluctuate in temperature with the surroundings, being therefore completely unprotected. This can only be overcome by providing thermal insulation independently of the grain itself. It seems probable that the cost of doing this would be prohibitively high for small quantities of grain, for the larger the quantity stored the smaller the amount of surface exposed per ton.

The only cool store for grain of which I am aware is that at Malmo, in Sweden, designed by the firm Svenska Flaktfabriken, and operated by Weilbull's, the seed merchants. This store holds 6,000 tons of wheat in a single bulk, a quantity which was chosen on economic grounds as being the most satisfactory for the purpose. Insulation 4 in. thick is provided and air is circulated within the silo at intervals in order to prevent the establishment of temperature gradients in the grain. The grain is cooled solely by circulating outside air at suitable times, most frequently at night, when it is cooler than the grain. The aim is to bring the grain to 5° Centigrade (41°F) or lower. When this temperature is reached, no more air is brought in from the outside. The amount of insulation is calculated to be sufficient to prevent the grain temperature rising above 10° Centigrade (50°F) throughout the summer.

This Swedish store was designed for long term storage. The present requirements are somewhat different, for it would be sufficiently useful if

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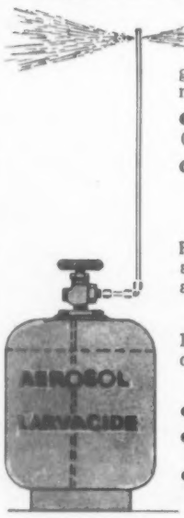

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it were possible to store grain right through into spring; less thermal insulation would therefore be required. The most difficult period for a method of storage which depended for its success on the establishment of low temperatures in grain would be immediately after harvest, while atmospheric temperatures are still high. With artificial refrigeration this need present no trouble but even without any artificial cooling there is a considerable scope for cooling by ventilation at night only. Even in the height of summer, temperatures are usually quite low for an hour or two each night and it would be quite possible to carry out sufficient ventilation at that time only.

The system of bin ventilation with atmospheric air (not to be confused with "in-bin drying") is really a rudimentary form of this. I believe that there is considerable scope for further developments on these lines, using a certain amount of artificial insulation.

——BREAD IS THE STAFF OF LIFE——

Flat Leather Belts, Tension Bases for Power Transmission

By Francis A. Westbrook

EDITOR'S NOTE: The following article is from the P.T.C. Bulletin of the Power Transmission Council.

Versatility of flat leather belts for the mechanical transmission of power can be illustrated by considering a few highly diversified drives which have a well substantiated record of successful operation in just one section of Louisiana.

One very interesting example is to be found in a cottonseed oil mill in connection with a five-high crusher roll. These rolls were formerly driven by gears from the bottom roll which was powered by a belt drive from a lineshaft. In addition to being noisy, this drive was expensive to maintain.

When the wear of the rolls made it necessary to grind them, the driving gears also had to be reground to compensate for the change in diameter of the rolls. This called for a complete dismantling of all the five rolls, naturally an expensive operation which could upset production schedules. It was consequently decided to use the flat leather belt drive.

Diameter of the rolls is 15 in. and their length 60 in. They are driven at each end. Each drive consists of a cast iron lineshaft pulley 15 in. in diameter with a 13 in. face, a fiber pulley on the bottom roll 17 in. in diameter with a 12 in. face and four fiber pulleys on the other rolls 15 in. in diameter by 12 in. face. Each belt is 12 in. wide, two-ply chrome leather made endless on the pulleys. A floating type idler pulley swung from the ceiling maintains the proper tension on each of the belts.

This new drive is quiet, costs less to mantain and also saves power. It paid for itself in about two years.

Satisfactory Performance

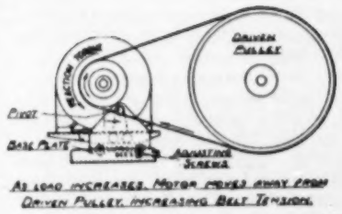
In this same plant the atmosphere is hot, dusty and humid but by properly installing the flat leather belts highly satisfactory performance has been obtained in the cake stripper room where the conditions are particularly unfavorable. One of the drives in this department consists of a 5 hp., 1800 rpm. induction motor driving a pump handling the vegetable oil and which is in continuous operation over a long period of time.

The fiber motor pulley is 6 in. in diameter with 4½ in. face and the cast iron pump pulley 14 in. in diameter with 4 in. face, with a distance of only 24 in. between centers. Due to this short center distance and the other adverse conditions in this location, the motor has been mounted on a tension control base. A 4 in. wide two-ply royal chrome leather belt is used, made endless on the job.

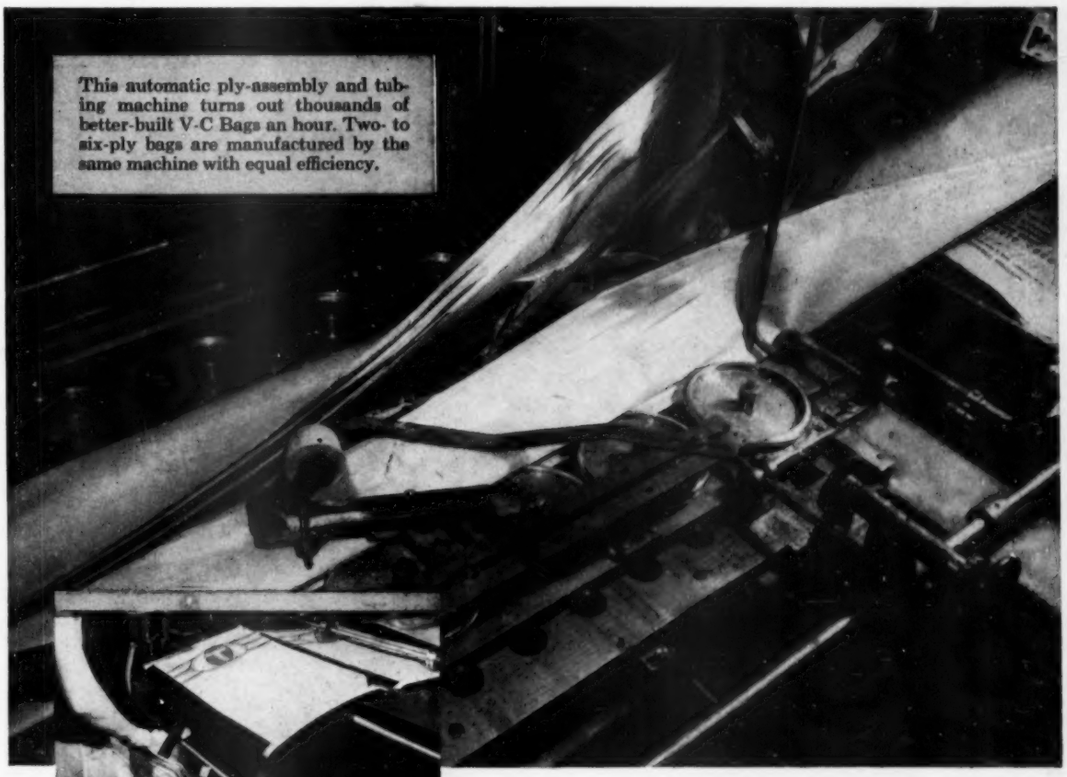
Other motors in the cake stripper room are also mounted on tension control bases and in all cases endless two-ply royal chrome leather belts are used. One of the motors powers a modern group drive, employing a 6 in. belt of the same material.

It should be explained that the royal chrome leather belts are subjected to two tanning processes. One of these is the oak tan to provide lateral stiffness and the other is the chrome tan to give maximum flexibility (as for short centers and large speed reductions), higher coefficient of friction, minimum stretch and increased resistance to oil, acid, water, salt, sugar, dust, heat, cotton oil, soy bean oil, etc.

Reasons that this type of belt was



selected for use in a cotton oil mill thus becomes obvious. Furthermore these belts, are, due to their flexibility and high coefficient of friction, well adapted for highly fluctuating



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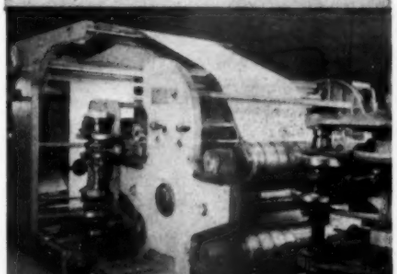

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and shock loads such as are likely to be encountered with the crusher rolls, for example.

Other Drives

Other interesting flat leather belt drives are to be found in a Louisiana rice mill. One of these consists of a 150 hp., 2300 volt, 1200 rpm. induction motor mounted on a tension control base. The fiber motor pulley is 20 in. in diameter by 21 in. wide and the split steel driven pulley is 72 in. in diameter with a 20 in. face. A 20 in. endless double-ply high capacity royal chrome leather belt is used. The center distance is only 54 in.

This drive formerly employed a long belt with the motor mounted on the floor on a sliding base. Considerable trouble was experienced by dust collecting on the long belt and causing it to slip. The motor also required excessive maintenance because dust collected in the air gap with resultant overheating and burn-outs.

When the mill was modernized, the motor was raised off the floor and mounted on a tension control base, to permit of the short distance between centers. Since that was done, about six years ago, no maintenance has been required.

Another typical modernized drive in this plant is for the bag printing press. This consists of a 20 hp., 1200 rpm. induction motor on a tension control base mounted on the ceiling. The motor pulley is 7 in. in diameter with a 7 in. face and the split steel driven pulley is 38 in. in diameter with a 6 in. face. Distance between centers is 44 in. A 6 in. oak tanned double-ply, high capacity leather belt transmits the power, the conditions in this case being such that the more expensive royal chrome belting is not required. This drive also has given trouble free service for several years. All drives in the mill have now been converted for tension control motor bases and the use of endless high capacity leather belts with short center distances.

Primary Source of Power

A modernized ice manufacturing plant uses flat leather belts and a diesel engine as its primary source of power. This engine, which operates at 257 rpm., is direct-connected to a shaft with one 72 in. diameter, 12 in. face pulley and one 60 in. diameter, 8 in. face pulley. Both are steel split pulleys. These drive two ammonia compressors, each equipped with 60 in. diameter driven pulleys. The higher speed compressor is driven from the 72 in. diameter pulley and the slower speed compressor from the 60 in. pulley. The distance between centers in each case is 10 ft. and each compressor is driven by an 8 in. four-ply endless royal chrome leather belt.

In addition there is a 37½ kw. generator driven from the 72 in. diameter pulley on the lineshaft, the belt being under the belt which drives the higher speed compressor. In this case the speed of the generator is stepped up to 1800 rpm. and has a pulley of correspondingly small diameter. The distance between centers is 52 in. and because of the high speed ratio the generator is mounted on a tension control base. Power is transmitted by a 12 in. double-ply endless royal chrome leather belt.

This generator supplies power for motors driving the deep well pump, agitator, storage room compressor, scoring machine, etc.

The belts driving the ammonia compressors operate slack, with the relatively long center distances and speed ratios close to or at unity thus providing maximum arc of contact and making practicable the use of narrower, and less expensive belts. Maintenance has been minimal.

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—BREAD IS THE STAFF OF LIFE—

SAFETY COUNCIL HAS NEW TRAINING FILMS

CHICAGO — The National Safety Council's new series of human relations training films for foremen is now available. Featuring O'Grady, the safety skeptic from the Council's film, "A Gray Day for O'Grady," this three-film set tells how a foreman learns about people.

Prepared under the supervision of the Council's industrial department, the films run 12 minutes each and are available in 16mm sound movies as well as 35mm sound slidefilms.

"Showmanship in Safety" — the National Safety Council's new book of attention-getting stunts and gimmicks—also is available. The book tells how to add sparkle to safety meetings, how to sell employees on wearing protective equipment and gives many other assists to the safety man in putting across his program.

"Showmanship in Safety," is illustrated with cartoons and bound in a two-color heavy paper cover. The book sells for $1.25 to council members and double that price to nonmembers.

—BREAD IS THE STAFF OF LIFE—

HEADS DIVISION

MARION, OHIO—The Fairfield Engineering Co. has announced the appointment of William H. McEnally as sales manager of its standard products division.

He has been with the company since 1950. The standard products division manufactures and markets feed mixers, hammermills, bulk bins, construction conveyors and other standard products. Another division, the contract division, manufactures elevating and conveying machinery for the handling of bulk materials.

Cooperating With Unions in Promoting Accident Prevention

By R. J. O'Leary

No program is effective unless it has a purpose and all affected by the program cooperate in its success.

A safety program in any company has many purposes, its prime purpose being the protection of the worker or workers from bodily harm or occupational disease.

The remaining purposes are to prevent waste, structure or equipment damage, maintain employee morale, reduction of insurance costs, and the multiple other factors that make up operating costs.

To attain these purposes we must use any and all methods within our means. Dollars? Dissemination of information? Experience? Cooperation? Yes!

Cooperation will carry more weight than all the others. Without it, dollars are worthless, propaganda ineffective, information may as well be kept, and accident experience will just pile up.

Who shall cooperate? Safety is everybody's business. Let's get everybody in the boat. Let's make it an audience participation program.

Full earnest cooperation on the part of each will produce mutual understanding, mutual pride in results, and mutual appreciation for the part each plays in the program.

The accident prevention problem can only be solved by full cooperation between emloyer and employee.

Basic Principles

There are three basic principles to any sound safety program:

1. The legal and moral obligation of the employer to initiate, foster and perpetuate a sound, effective safety program; to provide safe working conditions, equipment and personal protective apparel; to develop an effective safety training program for supervision and employees; to encourage interest and participation in the safety program.

2. The moral obligation of the individual employee to work safely; to have regard for fellow employees' safety; to use knowledge and experience to prevent accidents; to contribute to the improvement of the safety program.

3. The moral obligation of the union body to cooperate within the limits of its union contract and to take its agreed part in the safety program; to use its influence in encouraging membership participation in that program; to promote the program through its publications, meetings, and educational courses.

We want the union to take an active part in the safety program.

Safety is for the protection of a union as well as for the protection of the individual member, for the union should recognize that an injured member will be an inactive member.

Safety thinking has changed over the years. In the early days of safety and in the early days of organized labor, safety was considered the sole responsibility of the employer. Today, this thinking has changed.

Everybody's Business

We have hewed to the line that safety is everybody's business until everyone, labor and management, should be convinced that there can be no isolationists in the war against accidents.

We must convince the union body of that.

The code of the unions is for the protection of the worker—economically, industrially and physically.

The union asked to be a part of your organization when they effected a labor contract with your company. They established bargaining committees, grievance procedures, labor-management councils and other agencies to promote the economic welfare of their members.

Why not persuade them to include the promotion of the physical welfare of their members? Why not get them to be active in our safety program?

We cannot afford to ignore them as a unit on safety, any more than we can afford to neglect to inform the new worker concerning the hazards of his job.

Something about safety is written in most contracts. It has its place and in many contracts it is spelled out.

Over the years many grievances have been filed on safety, which to me indicates that the union is in-

EDITOR'S NOTE: The accompanying article is from a paper presented at the National Safety Congress as part of a food section symposium on safety men's cooperation with various organizations in promotion of accident prevention. The author is safety director, industrial relations department, Corn Products Refining Co., Chicago.

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terested in protecting its members.

In some companies the union body is requested to submit names for the safety committee to represent the union; in others they have the selection of this committee; in others the company appoints the committees; but in all companies they will cooperate, if given the opportunity.

Put it up squarely to them—that they owe it to their membership to cooperate just as the company has the responsibility to the employees to protect them from the hazards of their occupation. Safety is a great measure of security for their members, physically as well as economically.

Any corrective suggestions and recommendations should not be considered grievances until you want them to develop to this stage. Recognition of the suggestions for safety should be made, regardless of who may make them.

Inviting the union to participate in your safety program should not mean you are asking for trouble.

The accidents, or trouble if you want to call it such, oft times occur when poor working conditions, such as inadequate lighting, poor ventilation and sanitation, undue fatigue, and health risks are allowed to exist.

Do these sound familiar to you as possible causes for accidents? When remedial action is taken to eliminate or lessen hazardous conditions, isn't our safety program being carried out successfully? Aren't we accomplishing what we are earnestly and conscientiously trying to do—save a life or a limb!

Makes Task Easier

Accident prevention has passed the stage of protecting the man from the machine. We are now faced with the problem of saving the man from the man himself. Getting all groups, including the union, to assist you on this problem will make your task easier and accomplish your aims quicker.

Will this give groups too much power? How much is too much? If it is a prod to get supervision to get a hazardous condition made safe, will it not serve the purpose of a safety program? The protection of the worker?

If it makes the managerial staff aware that the representatives of the workers are fully behind a program of accident prevention, will it not better serve the purpose of a safety program which is the protection of the worker?

If it gives the worker the sense that his union is endeavoring to protect him physically as well as economically and that he may have to answer to his fellow members for violation of safety rules, will it not better serve the purpose of a safety program which is the protection of the worker?

Many unions use their efforts to encourage their membership to follow the safety rules established. Certainly nothing is wrong in such efforts; even should they recommend a penalty for violation of safety rules. I would not consider such as giving them power. A few years ago the union did effect such a penalty at one of our plants. A worker, while on a scaffold, had his leg injured when a board broke. The extent of the injuries was abrasions to his leg. He did not report to First Aid until four days later when an infection had set in. No. 1 rule on safety is that all injuries, no matter how slight, must be reported immediately to First Aid. The union recommended to management that the worker be given a one week lay-off after he was discharged from treatment by the medical department. The management concurred with the recommendation. He got a week off.

That's putting teeth in the safety rule book. But isn't that what safety men want?

In summing up this problem of how we may cooperate with the union, may I say this: Safety or accident prevention has always been an attempt for cooperative effort between all parties concerned.

Who are the members of the union? Are they not our employees? What is wrong with encouraging them as a union body to aid in the company's safety efforts? Certainly in asking your unions to participate in your program you are not giving them power to run your plant. You are asking for their cooperation in a field of human good; and, I feel certain, if the union knows and feels that management is trying to do a sincere job, their cooperation, too, will be sincere.

Cooperation is there for the asking. Use it!

—BREAD IS THE STAFF OF LIFE—

KANSAS STATE CHANGES MILLING CURRICULUMS

MANHATTAN, KANSAS — Beginning in the fall of 1954, there will be only two curriculums in the department of flour and feed milling industries at Kansas State College—one in milling technology and one in feed technology.

Instead of having three milling curriculums—milling administration, milling chemistry and milling technology—one curriculum in milling technology will be established. This curriculum will have three options—chemistry, administration and operations. The student receiving his degree in milling technology must choose one of these options for specialized training during his junior and senior years.

The feed technology curriculum has three options—operations, nutri-

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tion and administration. A few modifications in course arrangement and some changes in the basic science courses have been made. Calculus and descriptive physical chemistry have been introduced to the nutrition option. The freshman year of both the milling and feed technology curriculums will be identical.

——BREAD IS THE STAFF OF LIFE——

CANADIAN TO HELP IN KANSAS STATE STUDY

MANHATTAN, KANSAS — Dr. Philip Nordin, a Canadian citizen, has been appointed temporary assistant professor in the flour and feed milling industries department at Kansas State College to spend a month doing research on use of honey in baked products.

Dr. Nordin's research will be sponsored by the eastern utilization branch of the research administration in the U.S. Department of Agriculture. His bachelor's and master's degrees are from the University of Saskatchewan; his Ph.D. from Iowa State College in 1953. He is now a lecturer in chemical engineering at the University of Toronto.

Beginning June 1 at Kansas State, he will assist Dr. John A. Johnson of K-State in bakery research on the browning reaction in cake products made with honey. The two scientists will attempt to find ways to control the browning reaction that occurs in cakes when a high concentration of honey is used.

——BREAD IS THE STAFF OF LIFE——

JOHN DRAKE KILLED

YELLOW SPRINGS, OHIO—John E. Drake, president, J. E. Drake Mill Machinery Co., was killed recently when his car was struck by a stolen car being pursued by state policemen.

The collision occurred at Xenia, Ohio. Mr. Drake, who was alone in his car, was pulling out of a filling station when the speeding automobile struck his car broadside The speeding car was reported to have been stolen in Cincinnati and was being driven by a Chicago hoodlum, according to the police.

Nelson

(Continued from page 1a)

ure, but rather provide for selling certain products by weight, retaining the trade practice of stating quantities in terms of bushels. The Bureau of Standards concurs in the opinion that the use of dry measures is very unreliable and unsatisfactory, and advises purchase of dry commodities by weight; and it is a fact that in this country virtually all wheat, for instance, which is the commodity that for the flour miller holds the greatest interest, is traded in bushels, not as of a certain volume, but of a definite, by all states accepted weight—namely, 60 lb.

The question may now be asked: If the miller receives his wheat by weight and also delivers his flour and offal by weight, why then go to such lengths to define the volumetric bushel?

Answers Given

One answer is that it is usually well to begin a discussion with the basic concepts; and another answer is that two instances may still be pointed out where the volumetric bushel is playing a part.

First, for grading of grain. Ascertaining the weight per volumetric bushel of grain is one of the main factors in determining the grade of shipments of grain. To determine the so-called test-weight, standard equipment is required consisting of a balance with suspended hopper, a one-quart brass kettle, and a hardwood striker; only about 1⅛ quarts of sample grain is used to fill the quart kettle to overflowing from the suspended hopper. The heap on the kettle is struck from the top according to standard instructions; the kettle, now containing an even quart of grain, is weighed on the balance and a test weight in pounds and tenths of pounds per volumetric bushel is read directly on the beam.

Secondly, the capacity of grain storage bins is calculated in volumetric bushels. As we saw, all our grain is received and binned by weight (60-lb. bushels, if it is wheat), and removed eventually also by weight (60-lb. bushels again, if wheat). But there is much activity in the elevator —grain moving in, out and about— and it is necessary as a safeguard against loss and error to take frequent, perhaps daily, inventories. An inventory to be strictly correct should, of course, also be in weighed units. It is physically impossible, however, to weigh all stored grain daily, so the next best thing is done—namely, estimating the weight by assuming that each weighed 60-lb. bushel equals a volumetric bushel. You know the capacity of your bins. Long before your time someone probably made up tables showing the number of volumetric bushels held by bins at all conceivable levels. The test weight of your wheat does not average 60 pounds, however, so your stock later on will turn out long here and short there, and paper adjustments must be made.

In recent years millers have been called upon to make similar estimates of storage bins of bulk flour and bulk feeds, and are doing a fair job of it. Not in terms of volumetric bushels, however, but in terms of "units" or

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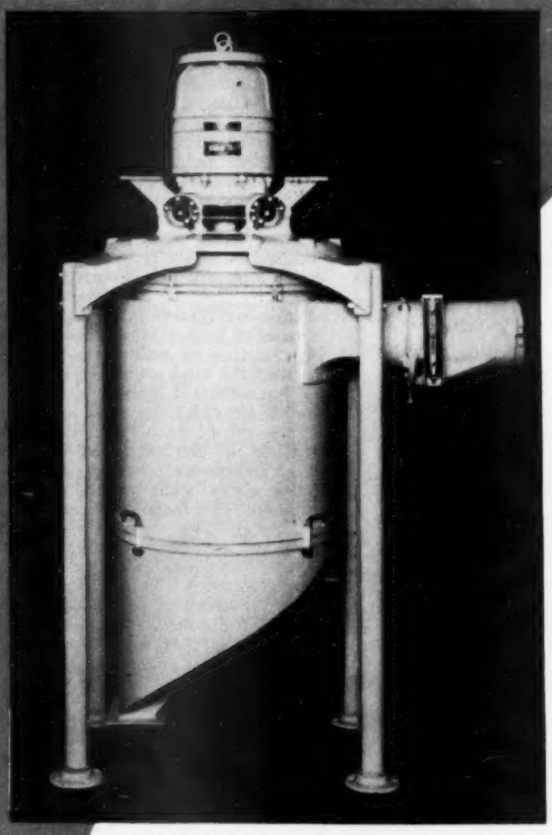

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cwts. It could be done in bushels, but that would not correspond with our package units. Wheat, of course, could be estimated with equal ease and accuracy in units of 100 lb., as in units representing 60 lb. by assuming that 100 lb. of wheat would occupy $\frac{2150.42 \times 100}{60} = 3{,}584.034$ cu. in.

To repeat: to assume that a volumetric bushel of wheat equals 60 lb. is a fair approximation, never perfect, but it is a check.

The Important Bushel

The volumetric bushel is not the really important bushel. The one that really matters, and, therefore, the one to observe next, is the weighed bushel, sometimes also called the "standard" bushel. We decided that as far as buying and selling grains and certain other agricultural products are concerned, the bushel is but a unit of weight; and as each state has established that certain definite number of pounds of commodity which must be furnished per bushel whenever bushels are specified, one might be led to think that, to operate the large grain scales used in loading, receiving and transferring, instead of the usual balance weights, marked 1, 2, 5, 10 lb. and so on, specially made up bushel-unit weights might be used, corresponding to the state regulations for whatever product was going over the scales. Such is not the case. State inspectors, who inspect all grain handling scales periodically, bring their own standard size scale weights; and nothing but ordinary standard weights are ever used on them at any time.

Thus, the quantity of grain weighed, whether it be a carload or much less, whether determined by a state weigher or an employee, is always expressed in pounds. The number of bushel units is ascertained by resorting to arithmetic—namely, dividing the total pounds on the scale by the standard weight per bushel used in the particular state as, for instance, 60 lb. for wheat, 56 lb. for corn, 32 lb. for oats, and different other divisors for other products.

Sometimes such paper work is avoidable. For instance, when taking test weights, we weighed a quart of grain and read the test weight directly on a beam calibrated for bushels. It might easily have been calibrated for other units, as for the quart itself or for pounds per cubic foot. The point is that we escaped a lot of arithmetic, in this case multiplying our quart weight by 32 each time we made a test weighing.

A Lot of Arithmetic

When weighing wheat lots we cannot read the bushels directly, but must use arithmetic at each weighing; and since a year's crop of wheat alone, for instance, may be roughly a billion bushels, there is a lot of weighing going on and, consequently, a lot of arithmetic to do. Are any savings possible here? Let us look at some examples.

Two hundred or more truck loads of wheat are hauled from a farm to a country elevator. The weight of each load in pounds is converted to bushels; each load in pounds and bushels is listed on or attached to the statement to the farmer, in order that he may assure himself that no conversion error was made.

Shipments of wheat from country elevator to terminal or to mill elevator by railway is done in boxcars, the capacity of which is rated in pounds. Conversion of bushels sold to pounds is required in order that cars of appropriate capacities in pounds may be requested. This same conversion is repeated before loading takes place, as the wheat must be loaded into the boxcar by the pound. The actual pounds loaded are then converted to bushels for statement to buyer and for deduction from inventory. Railways charge for freight in dollars and cents per cwt.; so the railway will check-weigh a number of the cars on its scales in cwt.

Terminal or mill elevators will weigh the car, or cars, of wheat received in pounds; these are converted to bushels to issue "account sales" to seller, and to add the wheat received to inventory in bushels. Statements passing between buyer and seller customarily show the pounds

Milling Staff Adds Another "Miller"

MANHATTAN, KANSAS — The "Millers" are keeping things pretty much to themselves in the milling department at Kansas State College, Manhattan.

Employment of Donald Miller recently as research assistant in charge of the department's baking laboratory makes three "Millers" on the staff. The other two, Byron S. Miller and Gerald D. Miller, have been with the department since 1946.

In addition, there is a Max Milner in the department but he now is on a leave of absence acting as adviser to the Israel government on grain technology problems and is not contributing to the current confusion.

It may be only natural for the "Millers" to gather at K-State, since this college is the only one in the western hemisphere offering a four year curriculum in milling industry.

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as well as the bushels, so each may prove to the other that no conversion error was made. If the transaction is made through a broker or a subterminal elevator, all figures must be checked or reconverted by them.

In the Mill

In the flour mill the grinding rate of a manufacturing unit is usually stated in bushels per hour. On this basis wheat required for grinding is first calculated in bushels with due regard to possible gain or loss; then the bushels required are converted to pounds, and approximately such quantities transferred from the mill elevator through the scales to the mill headhouse. The actual pounds of wheat weighed are converted back to bushels again and deducted from the wheat inventory according to percentages of the different components of the wheat mix specifications.

The bushels of the wheat delivered are simultaneously charged to the mill; but in some instances automatic dump scales at the head of the mills, in multiples of weight-bushels—as 1, 2 or 3 bu. capacity, furnish an exact determination of the amount of clean wheat ground. Flour yields thus can be calculated both against the uncleaned and the cleaned and tempered wheat; in either or both cases the bushels of wheat charged to each flour brand must be converted to pounds, as the flour is packed on the pound basis. Even the "pound yield" is traditionally converted to a "bushel yield," as "2 bu. 20 lb." required to make 100 lb. of flour rather than plain "140 lb."

It must be remembered, also, that many of the described operations are preceded by much planning and many calculations of costs and schedules, etc.; following each operation there is a checking for errors; all of which may require even more duplicate and additional conversions than described previously. From the standpoint of economy it would be difficult to say which, if any, of these perennially alternating conversions could be eliminated if we wish to maintain the bushel unit. Certainly the bushel unit cannot endure without conversions to and from the basic pounds, whereas it would appear that the pound would do very well by itself. Therefore, it must be concluded that the bushel unit is the sole cause and reason for all this additional detail; and that this detail and an inescapable minimum of conversion errors are penalties we must pay for having the bushel unit.

Differences Noted

Wishing to keep our transactions from becoming unduly complicated, we have assumed in the foregoing examples that all our operations were with wheat, which has the relatively simple "standard" bushel-weight of 60 lb.; but there are many others. Lists of grains and other agricultural products quoted by the weight-bushel may contain a number of 40 or more. A few of the bushels, like that of wheat (60 lb.) and of oats (32 lb.), will be found to be alike in all states of the union; but corn may be 52 or 56-lb. bushels; barley, 46, 48 or 50-lb. bushels; other agricultural products may have four, five, six and even more different "standard" bushel weights in the various states. Let the buyer beware! But pity also the poor unfortunate compiler of market information and national statistics, who, to make the furnished production data workable, first must convert most of the listed quantities, given in all the various sizes of bushels, into their only common denominator, the pound.

For most other production data, summaries in pounds are considered both desirable and satisfactory—not so in agricultural statistics, where the reverence for tradition remains; here the elsewhere adequate and convenient pound summaries are required to be reconverted into multi-sized bushels before they are thought worthy of presentation for public and private use. To the casual reader and observer these units appear as just bushels. The fact that one—rye, for instance—usually equals 56 lb. of product, and another — oats — equals 32 lb. generally escapes notice, and an erroneous impression of the relative levels of crops and prices is left with the majority of the people.

Businessmen, however, who do know and recognize the difference in bushels and other users of statistics and market information must often again take time to reduce various presented quantities of bushels or prices per bushel back to pounds and prices per pound before the true comparison between products for different practical purposes can be re-established.

Comparison

It may be enlightening to make a rapid comparison of the manner in which quantities of various commodities are quoted and also listed in published statistics. With a few notable exceptions such as lumber, petroleum, gasoline and natural gas, most commodities, and these as we have seen include the grains, are sold by weight. Of these commodities, certain heavy or bulky ones are sold and listed statistically in tons: a few, as iron ore and sulphur, in long tons @ 2,120 lb., but more often in short tons @2,000 lb., as coal, a number of non-metallic minerals, woodpulp, newsprint, millfeeds, soybean meal, linseed meal, cottonseed meal, fish meal. Some products which are quoted by the pound are listed statistically in

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tons in large quantities—for instance, some of the metals.

It is particularly worthy of note, however, that a great multitude of products—for example, livestock and meat, poultry, fresh and processed fish, flour, whole milk, cheese, butter, shortening, oleo-margarine, lard, tallow, codliver oil, peanut oil, cottonseed oil, corn oil, olive oil, cocoanut oil, linseed oil, coffee, tea, pepper, tobacco, rubber, hides, wool, and many more too numerous to mention—which are quoted in pounds and cwts., are not listed in tons in large quantities but in multiples of pounds, as 1000s lb., 1000s cwt. and 1,000,000s lb. It probably is safe to say that in the majority of cases the fact is recognized that our so-called decimal system of numbers, which has as a basis the number "10," lends itself naturally and automatically to multiplication and division by 100, 1000, in short all powers of "10," and that the employment of units of weights not powers of "10" introduces an extra, never-ending, time-consuming burden of calculations on scratch paper and office machines from which no benefit whatever is derived.

Of all weighed commodities the grains and certain other agricultural products are almost the only remaining ones whose weights are concealed in artificial units of a different value for each product, having the appearance of being units of volume without being so in fact. It is amazing that the trade, where and as the use of the volumetric bushel was abandoned and it was compelled by law and its own better judgment to use the legal and adequate U. S. customary weights, should choose and insist on forcing upon itself and posterity awkward, odd-sized weight-bushels, as if wishing to rule that all future records show at least the approximate numbers of volumetric bushels each handling and transaction would have amounted to had the volumetric bushel still been legal in trade.

Would Be Improved

It is apparent that working procedures would be greatly improved by a total abandonment of the weight-bushel. A 100-lb. unit, used already in other trades and in our own for flour, could very conveniently take its place.

But, can it be done? Let us remember that many products other than agricultural were measured in bushels; none are now. Some western exchanges have abandoned the bushel for coarse grains; rice and grain sorghums may be found in one statistical reference in bushels, in another in 100-lb. units; many agricultural products, potatoes for instance, although still listed statistically in bushels, are being sold in at least substantial parts of our country in pounds or cwts.; peanuts and dry, edible beans are examples of agricultural products being both sold and listed by the pound and cwt. Surely, it can be done!

Is it worth while financially to abandon the weight-bushel? First, by eliminating conversions, all costly and embarrassing conversion errors are also eliminated. Add to that the fact that many milling employees in offices and through plants spend a small part of their working day converting bushels to pounds and pounds back to bushels—a very small part probably, but just as many small savings made in one place are as effective as one large saving, so one small saving in many places also equals one large one, even as countless tiny trickles will add up to one mighty river. If we could but calculate the time thus spent, which time could be diverted to useful purposes, it probably would be shown that for some of our larger milling concerns this saving of time might amount to thousands of dollars per year; for agriculture and associate trades and offices it might well be a million dollars a year, every year. Are such savings worth going after?

Powers of "10"

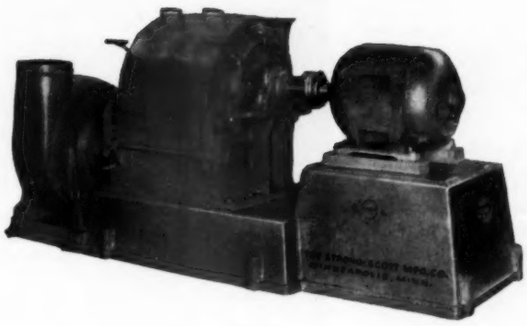
The prospective gain obtainable by discarding the bushel will be retained only—and this is essential—if one does not fall into a habit of substituting other units which are not powers of "10," such as the ton. As demonstrated, powers of "10" are adequate; none other are desirable. For the grains, including wheat, the 100-lb. unit should be perfect, just as now it is very satisfactory for wheat flour.

If some still think that the possible savings would be too small percentagewise to be attractive, the simplified working procedures ought to appeal to all—efficiency gained at no cost at all, market information and statistics improved—we cannot afford to ignore it. It probably is a fact, however, as the evidence seems to point out, that even now agriculture and its associated trades in this respect are in a state of transition, brought about by some of the affected persons and groups who have seen the possibility for betterment and are doing their bit to bring about improvements. Whether we do likewise or not, whether we hurry it or even try to hinder it, a day surely will come when the weight-bushel, perhaps quietly, perhaps through one last grand, general effort, will be laid aside and forgotten and the pound alone will prevail.

References

1. A. A. Ackels, The Superintendent's Role in Management; Milling Production, August, 1953.
2. J. W. Geddis, Scales the Miller's Ammeter; AOM Bulletin, May, 1953.
3. W. W. Bowman, Work Simplification—A Method of Reducing Costs; Milling Production, December, 1953.

CUT UPKEEP COSTS

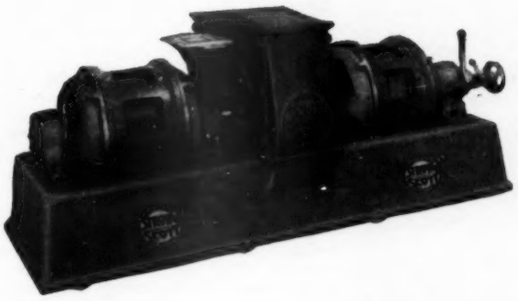


Strong-Scott Hammer Mill

Well designed, engineered and built, this machine is unequalled for custom grinding. Greater capacity, a more uniform product and sturdy construction mean lower grinding costs per ton and increased profits.

with STRONG-SCOTT Mills

Costly repairs are kept at a minimum when you install these Strong-Scott units. Built with the best materials by skilled mechanics under the supervision of competent engineers, these mills possess novel features which insure better grinding performance!



Strong-Scott Attrition Mill

This unit costs less to install, operate and maintain. Its better grinding performance means a cooler product, no dust explosion or fire hazard and low insurance rates. Standard and pneumatic types. Available in 24″, 26″ and 30″ sizes.

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Batch Feed Mixers
Molasses Feed Mixers
Feeder and Magnetic Separators
Attrition Mills
Hammer Mills
Head Drives
Conveyor Drives
Pneumatic Truck Dumps
Man Lifts
Pellet Coolers
Crumble Rolls
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and other machinery and supplies for Grain Elevators Feed Plants Cereal Mills

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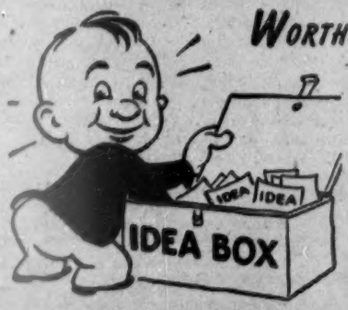

WORTH LOOKING INTO . . .

NEW PRODUCTS • NEW SERVICES • NEW LITERATURE

A reader service feature announcing the development of new and improved products, new services and new literature offered by manufacturers and suppliers. Claims made in this department are those of the firm concerned. Further information on any of the items discussed in this department may be obtained by writing the Reader Service Department of: The Northwestern Miller 118 So. 6th St. Minneapolis, Minn.

No. 2846—Catalog

Pulva Corp. has announced the publication of a new catalog describing and illustrating their two lines of equipment, Pulva-Sizers and Com-Bin feeders. The catalog gives dimensional information on both machines as well as detailed information regarding their industrial application. Check No. 2846 on the coupon and mail it to receive a copy of the catalog.

No. 4017—Anti-Static Solution

An anti-static and cleaning agent, Anstac 2-M, manufactured by the Chemical Development Corp., is finding use on plastic inspection windows on machinery in flour mills. The company says that if the surface is once treated with the product, flour will not stick to the inside of the window. The window will remain clean and the material in process will be visible at all times, the company points out. Anstac 2-M does not depend on moisture for its effectiveness, and the treated surface does not have a film of moisture to which materials will adhere. It is non-inflammable. Further information may be obtained by checking No. 4015 on the coupon and mailing it.

No. 4018—V-Belt Slidefilms

The second group in a series of educational 35mm sound slidefilms is now available from the general machinery division of Allis-Chalmers Manufacturing Co. The three films are on the subject of V-belt drives and each runs about 20 minutes. They are titled "In Every V-Belt Drive," "For Better Driving" and "Selecting a Drive." The first, in color, covers the engineering principles basic in V-belt drive applications. The second concerns itself with the installation and maintenance of multiple V-belt drives. The third tells how to check characteristics to find the best type of drive and then engineer it to do the job. Allis-Chalmers said requests for showings of any of these slidefilms should be made to the nearest Allis-Chalmers general machinery division district office.

No. 2863—Electronic Metal Detector

Dings Electronics, Inc. (subsidiary of Dings Magnetic Separator Co.) has announced a new electronic metal detector. The company says the detector is sensitive to all metals, ferrous or non-ferrous, and will detect even minute metal particles, signaling their presence and thereby protecting machinery and product quality against tramp metal damage. Various signal and reject system arrangements are available for use with the detector, to provide automatic detection, with manual, semi-automatic

or fully-automatic rejection of tramp metal. Included are arrangements for handling both bulk and packaged materials. Information on this electronic metal detector may be obtained by checking No. 2863 on the coupon and dropping it in the mail.

No. 2835—Hammer Mill Bulletin

A new 28-page booklet offered by Jacobson Machine Works contains information for setting up any type of grinding installation. Technical facts on good grinding procedure are included, as well as diagrams of typical installations, for both custom and commercial grinding. In addition, descriptions and specifications of the firm's hammer mills and auxiliary equipment are given. Copies are available without charge or obligation. Check No. 2835 on the coupon, mail it and the bulletin will be mailed to you.

No. 2843—Controls

Forty-six case studies of companies using electronic and photo-electric controls are outlined in a booklet called, "Cutting Production Costs with Electronic Controls," recently released by Photoswitch, Inc. The booklet has been revised from the original volume. Applications for industries using conveyors, bulk material feed controls, filling machines and counting machines are included. To secure the booklet check No. 2843 on the coupon, clip and mail it.

No. 2845—Fork Trucks

Underwriters Laboratories-approved electric Carloader series fork trucks for operation in hazardous areas covered by Underwriters' class I, group D classification, in capacities from 3,000 to 5,000 lb., are now available from Clark Equipment Co. These units are said to be the first production-model electric fork trucks to receive UL approval, and have an "EX" truck rating, which means that they are approved for operation in atmospheres containing explosive vapors. To obtain UL-approval, the standard trucks have been modified to make them explosion-proof, the company states. These modifications include a special frame and totally enclosed explosion proof panel, master switch and resistor, limit switches for the seat brake, foot brake, hydraulic control valves, pump motor and drive motor. Static-conductive cushion tires as well as special explosion-proof plugs are used on these machines. More information is available by checking No. 2845 on the coupon and dropping it in the mail.

No. 2854—Fire Regulations

Numerous fires caused by the careless use of welding or cutting torches prompted the Mill Mutual Fire Prevention Bureau to prepare a set of rules to cover the practice. The use of welding or cutting torches is becoming quite common in many mills and elevators, the bureau explains. Fires can easily be touched off unless the operator is well acquainted with rules of proper procedure. The rules covering welding safety practices may be obtained without charge by marking No. 2854 and sending the coupon below.

No. 2862—Vacuum Cleaners

Bulletin A-939, released by the Air Appliance division of U.S. Hoffman Machinery Corp., analyzes the problem of industrial dust and describes a line of vacuum cleaning equipment designed to combat it. The basic working elements of the company's permanently installed vacuum cleaning systems with central dust collection are described in detail. The 12-page, two-color booklet also explains and illustrates a wide range of coordinated vacuum cleaning accessories, including tools, hose and a newly developed compact storage locker. Portable separators, water traps, material intake valves, electric bag shakers and rotary discharge valves are individually described. The function of each is explained in the section on auxiliary equipment. To receive the bulletin check No. 2862 on the coupon and mail it.

No. 2818—Fork Truck Folder

A 2,000 lb. capacity fork truck, designed for fast tiering and available in two models, is described in a new four-page folder issued by the Elwell-Parker Electric Co. The truck, known as the F-26T, has one model with a 68 in. lift especially adapted for freight car and truck loading. The other model has an 83 in. lift and is designed for high tiering where head room is unrestricted. The 68 in. model is equipped with a compound lift type cylinder which gives 50 in. of lift before the overall height is increased. The other model uses a simplex lift cylinder providing 17 in. of initial lift. Its telescoping feature will raise a load to a total height of 130 in. Both models are battery powered. The operator rides in a sitting position. Two-wheel caster-type steering is used to absorb shocks and provide maximum angle turning. Copies of the folder are available by checking No. 2818 on the coupon and mailing it.

No. 2827—Generators

Called by the trade name, "Ready-Power," are the generators in a new series introduced and powered by

Send me information on the items marked:

☐ No. 2808—Hand Trucks	☐ No. 2846—Catalog
☐ No. 2813—Bag Closer Products	☐ No. 2851—Pusher Device
☐ No. 2818—Fork Truck Folder	☐ No. 2852—Portable Conveyor
☐ No. 2827—Generators	☐ No. 2854—Fire Regulations
☐ No. 2835—Bulletin	☐ No. 2862—Vacuum Cleaners
☐ No. 2836—Hammer Mill	☐ No. 2863—Metal Detector
☐ No. 2843—Controls	☐ No. 4017—Anti-Static Solution
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SLIP OUT — FOLD OVER ON THIS LINE — FASTEN (STAPLE, TAPE, GLUE) — MAIL

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No postage stamp necessary if mailed in the United States

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118 South Sixth Street
Reader Service Dept. Minneapolis 2, Minn.

Chrysler industrial engines. The generator series includes three sizes of 50, 30 and 20 KW ratings. Engine features include sodium-cooled exhaust valves, air-cooled generator, by-pass thermostat cooling system, down-draft carburetion, micro-babbitt bearings and superfinished bearing surfaces. A heavy base of welded structural steel eliminates the need for a special foundation, it is claimed. Each unit is a complete, package electric power generating plant ready for operation. Controls for both engine and generator are located in a single control cabinet. The series is designed for either standby or continuous service. Literature on these generators may be obtained by checking No. 2827 on the coupon and dropping it in the mail.

No. 2852—Portable Conveyor

Literature on the Elton Handi-Veyor, a portable conveyor with a detachable drive unit, is now available. The conveyor is made by the Chantland Mfg. Co. The firm says a 12-ft. conveyor weighs only 145 lb. and can easily be carried under a truck rack. The detachable power unit weighs 65 lb. and has a carrying handle. The machine is adaptable to truck use, freight cars, warehouses and for gravity conveying. Check No. 2852 on the coupon, clip and mail it to receive literature.

No. 2813—Bag Closer Products

The Dave Fischbein Co., manufacturer of the Fischbein portable bag closer, has announced three new products specially prepared for the proper maintenance of its bag closing machine. The first is a lubricating oil to lubricate all parts of the company's bag closer. This oil also flushes out abrasive dirt and dust that accumulate on parts. Also available is a cleaning solvent that was developed to clean food mechanism parts. It washes out all abrasive and harmful dirt. The third product is a thread lubricant which is used when closing treated, water-proofed or specially processed paper or textile bags with the bag closer. This product saturates an entire cone of thread in a few seconds, the company states. For more information check No. 2813 on the coupon and mail to this magazine.

No. 2808—Hand Trucks

The Clark Equipment Co. has announced a new line of powered hand trucks for materials handling, designated the Powrworker 26 line. Highlights of the line include a short overall length, increased load stability and added safety features. The firm states that the overall length of the truck is only 26 in. longer than the length of the load. The battery is underslung, close to the floor. The chassis frames are fabricated from plate and bar steel, formed to shape and electrically welded into a unit structure. Driving and hoisting motors are series wound, high torque type, ball bearing equipped, and horizontally mounted for maximum efficiency. All hand trucks can be ridden by the operator. The complete line includes low lift pallet and platform trucks in both 4,000 and 6,000 lb. capacities; telescopic tilting fork trucks in four base capacities of 1,500, 2,000, 2,500 and 3,000 lb., all at 24 in. center line or 48 in. load length; as well as a walk-it or ride tractor designed for either slow or high travel speeds. For complete information check No. 2808 on the coupon and mail to this magazine.

No. 2836—Hammer Mill

A new bulletin (1153-S), introducing the Schutte instant-screen-change hammer mill, has been published by Schutte Pulverizer Co. Features described in detail are: instant-screen-change; simplified, heavy steel construction; 10-surfaced adjustable hammers and built-in crusher-feeder. Also included is a complete table of capacities, dimensions and weights of the five models available as either belt driven or direct driven units. Available in three sizes to meet capacity requirements from 20 to 125 h.p., the mills are furnished in either belt driven or direct driven models. A matching, crusher-feeder may be built-in optionally as an integral part of the mill. For additional information check No. 2836 on the coupon and drop it in the mail.

No. 2851—Pusher Device

A newly designed hydraulic pusher device for use on hydraulically actuated fork trucks has been developed by the Elwell-Parker Electric Co. The attachment provides a means for mechanically pushing a load off a truck's forks and is designed principally for handling loads without pallets. The attachment does not reduce the capacity of a truck, it is claimed. The pusher unit consists of a vertical load screen guided by a pair of pantographs, one on each side. Power to extend and retract the screen is supplied by a telescoping, double-acting hydraulic cylinder acting through specially located thrust arms. The use of this type of cylinder gives more stroke with less overall height which permits tiering in low overhead areas such as box cars, etc., it is pointed out. For complete information check No. 2851 on the coupon and drop it in the mail.

DOW

INSECT INFESTATION TAKES A HEAVY TOLL OF STORED GRAIN

The granary weevil is only one of the many stored grain pests controlled by Dow Fumigants

Sitophilus granarius, or granary weevil, is one of the hungriest members of the weevil kingdom. It develops from a tiny larva which grew inside a single kernel of grain. The insect is actually about the size of a small grain of rice. In proportion to its weight, this pest eats or destroys more grain than would be consumed by a horse. This weevil is one of the primary threats to stored grain.

Granary weevil infestation in grain.

Shown is a striking example of shrinkage and destruction of stored grain as a result of insect activity. This can happen in *your* grain storages when your fumigation is ineffective! Dow's reliable fumigants and pesticides have saved millions of bushels of stored grain from insects. *They can save your grain.* Write our Fumigant Sales Department for complete information and for the name of a pest control operator in your area, specializing in flour and cereal mill fumigation with these proved products:

Dowfume® EB-5 for control of all types of stored grain pests in elevator storage bins . . . Dow Methyl Bromide for general space, vault, box car and tarpaulin fumigation for insect and rodent control . . . Dowfume® EB-15 for spot fumigation in machinery to prevent insect build-up between general space fumigations with Dow Methyl Bromide . . . Dow Mill and Bin Spray (containing Lindane) for residual spray, space spray or fog-type aerosol application. THE DOW CHEMICAL COMPANY, Midland, Michigan.

you can depend on DOW FUMIGANTS DOW

ALLIS-CHALMERS ISSUES BULLETIN ON V-BELTS

MILWAUKEE—A six-page interim bulletin which provides in condensed form the necessary information on the new method of calculating the horsepower capacity of a "Texrope" V-belt drive has been released by Allis-Chalmers Manufacturing Co.

The belt ratings resulting from this new method take into consideration effect of belt length, ratio of the diameters of both the driving and driven sheaves upon the horsepower rating of the belt, and resultant belt life. These are features which were not adequately reflected in the former V-belt horsepower ratings, the company said.

The new formula provides means of determining the ratings for both standard construction and high capacity "Texrope" V-belts.

All sheave and V-belt manufacturers in the industry have approved and accepted the belt horsepower ratings derived from this new formula, Allis-Chalmers said.

Copies of the advance bulletin, "Guide for Figuring 'Texrope' Drives," are available on request from Allis-Chalmers, Milwaukee 1, Wis.

—BREAD IS THE STAFF OF LIFE—

CONSTRUCTION BEGINS

WRIGHT, KANSAS—Construction work has started on a new 500,000-bu. elevator for the Wright Cooperative Exchange here. It will be located just south of the Santa Fe station and is being erected by Chalmers & Borton Construction Co., Hutchinson, Kansas. A rail sink for unloading car shipments will be built. Bins will be of hexagon design.

Control insects and rodents in your mill with...

1. AERO* LIQUID HCN, Fumigant, for plant-wide pest control

Destroys hidden insects, insect eggs and rodents in a matter of hours, when properly applied by an Industrial Fumigation Engineer. Effective, economical, convenient. No residue problems, no dust or dirt. No injurious effect on grain and flour stocks. Leaves no taste or odor after proper aeration. Does not affect baking qualities of flour. *Consult your local Fumigation Engineer.*

2. New, improved ACRYLON* Fumigant, for spot fumigation

Apply directly to milling machinery to hold down reinfestation between general fumigation periods. Economical, effective, easy to apply in small doses. Used properly at 3- or 4-week periods, new ACRYLON keeps infestation down to a safe level. *See your mill supply distributor.*

*Trade-mark

Other Cyanamid Products for Effective Pest Control

CYANOGAS® G-FUMIGANT . . . kills insects, insect eggs in stored grain.

CYANOGAS® A-DUST . . . destroys rodents outdoors.

Write for free, fully descriptive literature.

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AMERICAN Cyanamid COMPANY
AGRICULTURAL CHEMICALS DIVISION
30 U Rockefeller Plaza, New York 20, N. Y.

Midwest Feed Production School Set for Nov. 15-17

KANSAS CITY—The fifth annual Midwest Feed Production School will be held in Kansas City Nov. 15-17, it was announced following a meeting of the planning committee here recently.

The school, which has attained prominence in the feed industry throughout the country, will institute some new ideas in methods and curriculum, according to the committee report.

Members of the committee which met March 24 at the Hotel Muehlbach were Oscar Straube, Pay Way Feed Mills, Inc., Kansas City, chairman; Lloyd S. Larson, executive vice president, Midwest Feed Manufacturers Assn., Kansas City; Forest Lipscomb, Jr., Lipscomb Grain & Seed Co., Springfield, Mo.; Phil Murray, Pillsbury Mills, Inc., Clinton, Iowa; Lowell Judd, Albers Milling Co., Kansas City; Ted Hotchkiss, Ralston Purina Co., Kansas City; Edward Worth, L. C. Worth Commission Co., Kansas City; Milo Parker, General Mills, Inc., Kansas City; John Heimovics, J. B. Ehrsam & Sons, Enterprise, Kansas; H. O. Heckmann, Jones-Hettelsater Construction Co., Kansas City, and James H. Burrell, James H. Burrell & Sons, St. Louis.

The 1954 school will be held at the Hotel President. It is sponsored by the Midwest Feed Manufacturers Assn.

—BREAD IS THE STAFF OF LIFE—

PACAL DISTRIBUTOR

ST. PAUL — The Dabney-Alcott Supply Co., Inc., Memphis, Tenn., has been appointed distributor for Pacal hammers, according to Howard T. Eilers of Paper, Calmenson & Co.

Mr. Eilers said a full line of hammers and hammer clusters for all makes of hammer mills will be made available by Dabney-Alcott to feed mills in Arkansas, western Tennessee and southern Missouri.

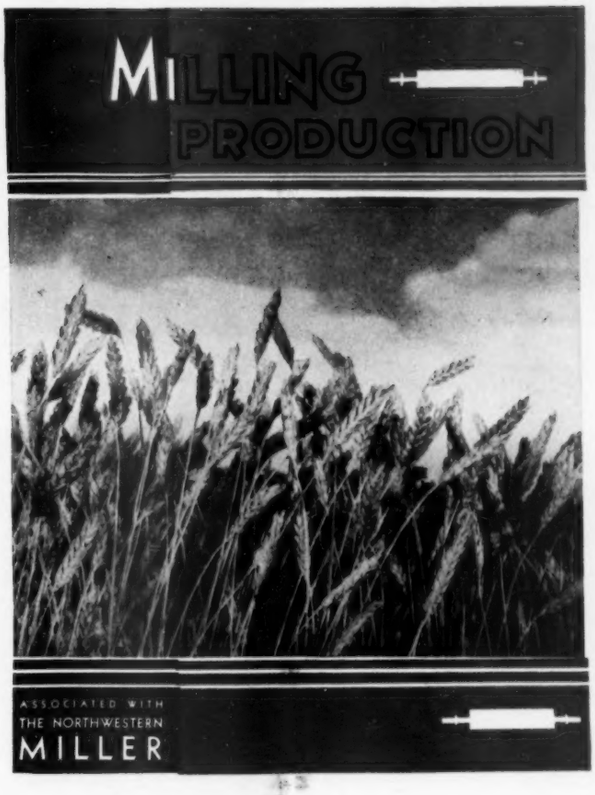
—BREAD IS THE STAFF OF LIFE—

LEATHER BELTING GROUP MAKES CHANGE IN NAME

NEW YORK—The corporate name of the American Leather Belting Assn. has been changed to the National Industrial Leather Assn. This change was made in order to provide a name more fitting with the leather products manufactured by the members, association officials said.

The association was organized originally as a group of manufacturers of flat leather belting. In recent years activities and membership have been extended so as to include manufacturers of mechanical leather packings, textile and other industrial leathers. Under the reorganization, the membership will be classified in three divisions—leather belting, mechanical leather packing and textile leather.

Philip G. Rhoads, J. E. Rhoads & Sons, Philadelphia, is president of the association; E. R. Rath, New York, is executive vice president and secretary. Richard H. Rhoads, J. E. Rhoads & Sons, is chairman of the leather belting division; C. C. Bradbury, C. W. Marsh Co., Muskegon, Mich., heads the mechanical leather packing division; John Henrikson, Graton & Knight Co., Worcester, Mass., heads the textile leather division.



TRIPLE YOUR ADVERTISING EFFECTIVENESS

1. WORKING CIRCULATION —Studies of flour manufacture show that 436 of the flour mills in this country produce 98% of the flour. Milling Production with its controlled circulation reaches the 921 key men in these 436 flour mills. This working circulation provides contact each month with the people who directly or indirectly control the buying — superintendents, operative millers, chemists and plant managers. *There is no waste circulation—only working circulation*—and you are assured of reaching your potential customers in the most productive mills.

2. LEADERSHIP MAKES READERSHIP — Readership surveys and unsolicited correspondence from its readers attest to the editorial leadership of Milling Production. That editorial leadership is held by complete words-and-pictures reports of the latest milling technology, current news, features and complete coverage of the activities of the industry's two technical associations. *The real price the reader of a publication pays is the amount of time he puts in reading that journal.* Over one half of the readers of Milling Production have requested that it be sent to their homes so that they may enjoy uninterrupted reading pleasure.

3. DOUBLE-DUTY DOLLARS —Money spent for advertising in Milling Production does double duty. In addition to reaching the production personnel, the advertiser's message is read in the Milling Production Section of The Northwestern Miller by the executives who approve purchase orders. *No other advertising medium in the flour milling industry offers this double-duty feature of reaching both groups* — mill technologists and executives—with the same advertising message and for the cost of one advertisement. Take advantage of this 100% coverage through one double-duty advertising contract.

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THE NORTHWESTERN MILLER • FEEDSTUFFS
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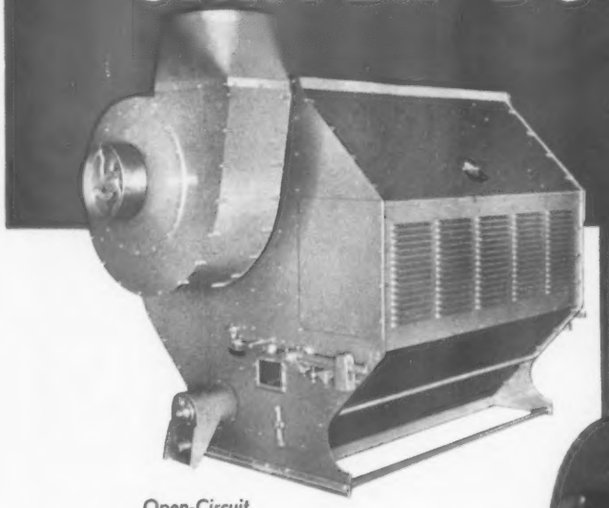
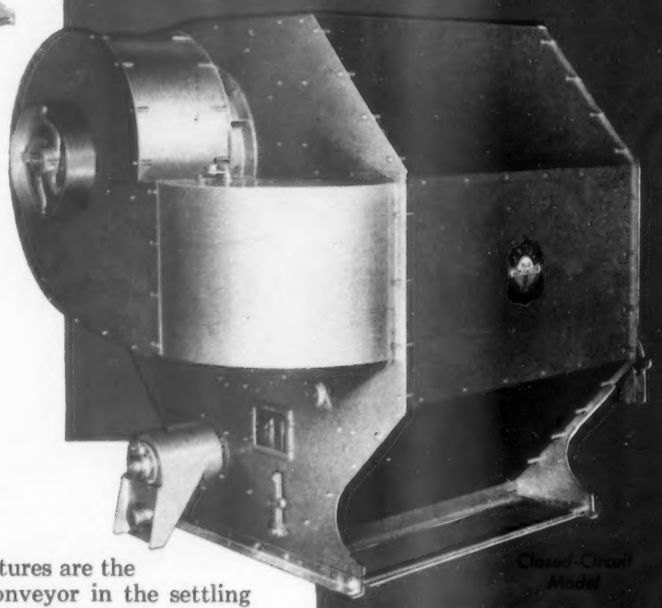
CARTER DUO-ASPIRATOR

Your choice of

OPEN CIRCUIT OR CLOSED CIRCUIT MODELS



Open-Circuit Model

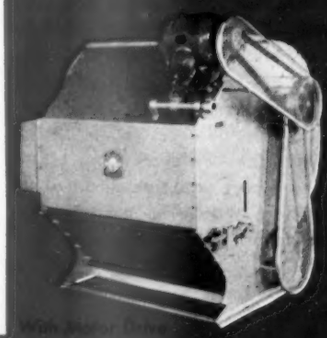


Closed-Circuit Model

The closed-circuit Duo-Aspirator provides two separations: the grain or heavier material is aspirated, and the lighter material removed. The open-circuit model provides three-way separation: the grain or other material is aspirated, the heavier material removed by aspiration is discharged from the settling chamber, and dust and other light material are exhausted from the fan to a collector.

Outstanding among recently added features are the drop-bottom clean-out beneath the conveyor in the settling chamber, and a self-cleaning suction tube leading to the fan ... which combine to prevent any accumulation of material within the machine.

Other important features include: all-metal construction ... ball-bearings throughout ... compactness ... low power requirement.



With Motor Drive

Avoid unnecessary losses by testing your grain by official standards.

HART-CARTER COMPANY